

10/593948

IAPS Rec'd PCT/PTO 22 SEP 2006

PCT/SG2005/000087  
Received 17 January 2006

8

## The Claims:

1. A scaffold for at least one of: tissue regeneration and bone growth; the scaffold being fabricated from at least two polymers; a first polymer of the at least two polymers being able to be leached by a solvent, and all other polymers of the at least two polymers being selected from the group consisting of: inert to the solvent, and having a lower dissolution rate in the solvent, wherein leaching of the first polymer is controlled so that leaching is maximized at a surface of the scaffold, and minimized at a core of the scaffold.
2. The scaffold according to claim 1, wherein the polymers are of differing rates of biodegradability.
3. A scaffold according to claim 1 or 2, wherein the scaffold has a graded porosity with high porosity at a surface of the scaffold, and low porosity at a core of the scaffold.
4. A scaffold as claimed in any one of the preceding claims, wherein the at least two polymers are selected from the group consisting of: natural polymers, a blend of natural polymers and synthetic polymers, synthetic polymers, polyglycolide, polylactide, poly L-lactide, poly DL-lactide, polylactide co-glycolide, poly-ε-caprolactone, and polyhydroxybutrate.
5. A scaffold as claimed in any one of the preceding claims, wherein the solvent is selected from the group consisting of: organic solvent, and inorganic solvent.
6. A scaffold as claimed in claim 5, wherein the organic solvent is selected from the group consisting of: acetone, dichloromethane, hex-fluoroisopropanol, chloroform, and alcohol.
7. A scaffold as claimed in any one of the preceding claims, wherein there are two polymers in a ratio in the range 60:40 to 30:70.
8. A method of fabrication of a scaffold for at least one of: tissue regeneration and bone growth; the method comprising:
  - (a) blending at least two polymers to form a polymer blend;
  - (b) forming the scaffold from the polymer blend;
  - (c) leaching the scaffold using a solvent to remove a first polymer of the at least two polymers, all other polymers of the at least two polymers being inert to the solvent,

wherein leaching of the first polymer is controlled so that leaching is maximized at a surface of the scaffold, and minimized at a core of the scaffold.

- 5 9. A method as claimed in claim 8, wherein all polymers of the at least two polymers all have a different rate of biodegradability.
- 10 10. A method as claimed in claim 8 or 9, wherein there are two polymers in a ratio in the range 60:40 to 30:70.
- 10 11. A method as claimed in any one of claims 8 to 10, wherein the at least two polymers are selected from the group consisting of: natural polymers, a blend of natural polymers and synthetic polymers, synthetic polymers, polyglycolide, polylactide, poly L-lactide, poly DL-lactide, polylactide co-glycolide, poly caprolactone, and polyhydroxybutrate.
- 15 12. A method as claimed in any one of claims 8 to 11, wherein the solvent is selected from the group consisting of: acetone, dichloromethane, hexfluoroisopropanol, chloroform, and alcohol.
- 20 13. A method as claimed in any one of claims 8 to 12, wherein the forming is by at least one method selected from the group consisting of: compression moulding, injection molding, rapid prototyping, and three dimensional printing.
- 25 14. A method as claimed in claim 13, wherein compression moulding is at a pressure in the range 0 to 20 Mpa, and at a temperature in the range 25°C to 80°C.
- 30 15. A method as claimed in claim 9, wherein the first polymer has a faster rate of biodegradability.
16. A method as claimed in any one of claims 8 to 15, wherein leaching is in an ultrasonic bath of the solvent.
- 35 17. A method as claimed in claim 16, wherein the solvent is at a temperature in the range 25°C to 50°C, frequencies being in the range 1KHz to 40KHz, and exposure time being in the range 5 minutes to 120 minutes.
18. A method as claimed in any one of claims 8 to 16, wherein the at least two polymers are milled prior to blending, milling and blending being in a cryogenic mill to form a particle size in the range 20 to 500µm.

PCT/SG2005/000087  
Received 17 January 2006

10

19. A method as claimed in claim 18, wherein the milling is at a cycle dependant upon at least one of: the type of the at least two polymers, and a desired particle size of the at least two polymers.
- 5 20. A method as claimed in claim 18 or 19, wherein milling is at a frequency in the range 15 to 30 cycles of one minute each.
21. A method as claimed in any one of claims 18 to 20, wherein during milling, an impaction rate is 15 impacts/second.
- 10 22. A method as claimed in any one of claims 8 to 21, wherein the scaffold has a graded porosity with a high porosity at a surface of the scaffold, and a low porosity at a core of the scaffold.
- 15 23. A method as claimed in any one of claims 8 to 22, wherein leaching includes: removal, and dissolution.
24. A scaffold when fabricated by the method of any one of claims 8 to 23.
- 20 25. A scaffold as claimed in any one of claims 1 to 7, or claim 24, wherein leaching includes: removal, and dissolution.